CLAIMS

1. A method of enhancing the dewatering of a paper sheet on a paper machine comprising adding to the paper sheet about 0.05 lb/ton to about 15 lb/ton, based on dry fiber, of one or more aldehyde functionalized polymers comprising amino or amido groups wherein at least about 15 mole percent of the amino or amido groups are functionalized by reacting with one or more aldehydes and wherein the aldehyde functionalized polymers have a weight average molecular weight of at least about 100,000 g/mole.

2. The method of claim 1 wherein the aldehyde functionalized polymers are selected from the group consisting of aldehyde functionalized polyamines and aldehyde functionalized polyamides.

3. The method of claim 1 wherein the aldehydes are selected from formaldehyde, paraformaldehyde, glyoxal and glutaraldehyde.

4. The method of claim 1 wherein the aldehyde functionalized polymer is an aldehyde functionalized polyamide.

5. The method of claim 4 wherein the aldehyde functionalized polyamide is an aldehyde-functionalized polymer comprising 100 mole percent of one or more nonionic monomers.

6. The method of claim 4 wherein the aldehyde functionalized polyamide is an aldehyde functionalized copolymer comprising about 5 to about 99 mole percent of one or more acrylamide monomers and about 95 mole percent to about 1 mole percent of one or more cationic, anionic or zwitterionic monomers, or a mixture thereof.

7. The method of claim 6 wherein the aldehyde functionalized polyamide is an aldehyde-functionalized copolymer comprising 1 to about 50 mole percent of one or more anionic monomers and 99 to about 50 mole percent of one or more nonionic monomers.

8. The method of claim 6 wherein the aldehyde functionalized polyamide is an aldehyde-functionalized copolymer comprising 1 to about 30 mole percent of one or more anionic monomers and 99 to about 70 mole percent of one or more nonionic monomers.

9. The method of claim 6 wherein the aldehyde functionalized copolymer is an aldehyde-functionalized amphoteric polymer comprising up to about 40 mole percent of one or more cationic monomers and up to about 20 mole percent of one or more anionic monomers.

10. The method of claim 6 wherein the aldehyde functionalized copolymer is an aldehyde-functionalized amphoteric polymer comprising about 5 to about 10 mole percent of one or more cationic monomers and about 0.5 to about 4 mole percent of one or more anionic monomers.

11. The method of claim 6 wherein the aldehyde functionalized copolymer is an aldehyde-functionalized zwitterionic polymer comprising about 1 to about 95 mole percent of one or more zwitterionic monomers.

12. The method of claim 6 wherein the aldehyde functionalized copolymer is an aldehyde-functionalized zwitterionic polymer comprising about 1 to about 50 mole percent of one or more zwitterionic monomers.

13. The method of claim 6 wherein the aldehyde functionalized polyamide is an aldehyde functionalized copolymer comprising about 50 to about 99 mole percent of one or more acrylamide monomers and about 50 to about 1 mole percent of one or more cationic monomers.

14. The method of claim 13 wherein at least about 20 mole percent of the amide groups of the polyamide have reacted with aldehyde.

15. The method of claim 1 wherein the aldehyde functionalized polymer is a copolymer comprising about 50 to about 99 mole percent of one or more acrylamide monomers and about 50 to about 1 mole percent of one or more cationic monomers wherein the copolymer is functionalized with glyoxal.

16. The method of claim 15 wherein the cationic monomer is a diallyl-*N,N*-disubstituted ammonium halide monomer.

17. The method of claim 16 wherein about 20 to about 50 mole percent of the amide groups of the copolymer have reacted with glyoxal.

18. The method of claim 16 wherein the nonionic monomer is acrylamide and the diallyl-*N,N*-disubstituted ammonium halide monomer is diallyldimethylammonium chloride.

19. The method of claim 18 wherein the aldehyde-functionalized polymer has a molecular weight of at least 300,000 g/mole.

20. The method of claim 19 wherein the aldehyde-functionalized polymer is a copolymer comprising about 70 to about 99 mole percent of acrylamide and about 1 to about 30 mole percent of diallyldimethylammonium chloride functionalized with glyoxal.

21. The method of claim 20 wherein about 20 to about 26 mole percent of the amide groups of the copolymer have reacted with glyoxal.

22. The method of claim 21 wherein about 0.5 lb/ton to about 3 lb/ton, based on dry fiber, of glyoxylated copolymer is added to the paper sheet.

23. The method of claim 1 wherein the aldehyde functionalized polymer is sprayed onto the paper sheet prior to press dewatering.